FIG. 1

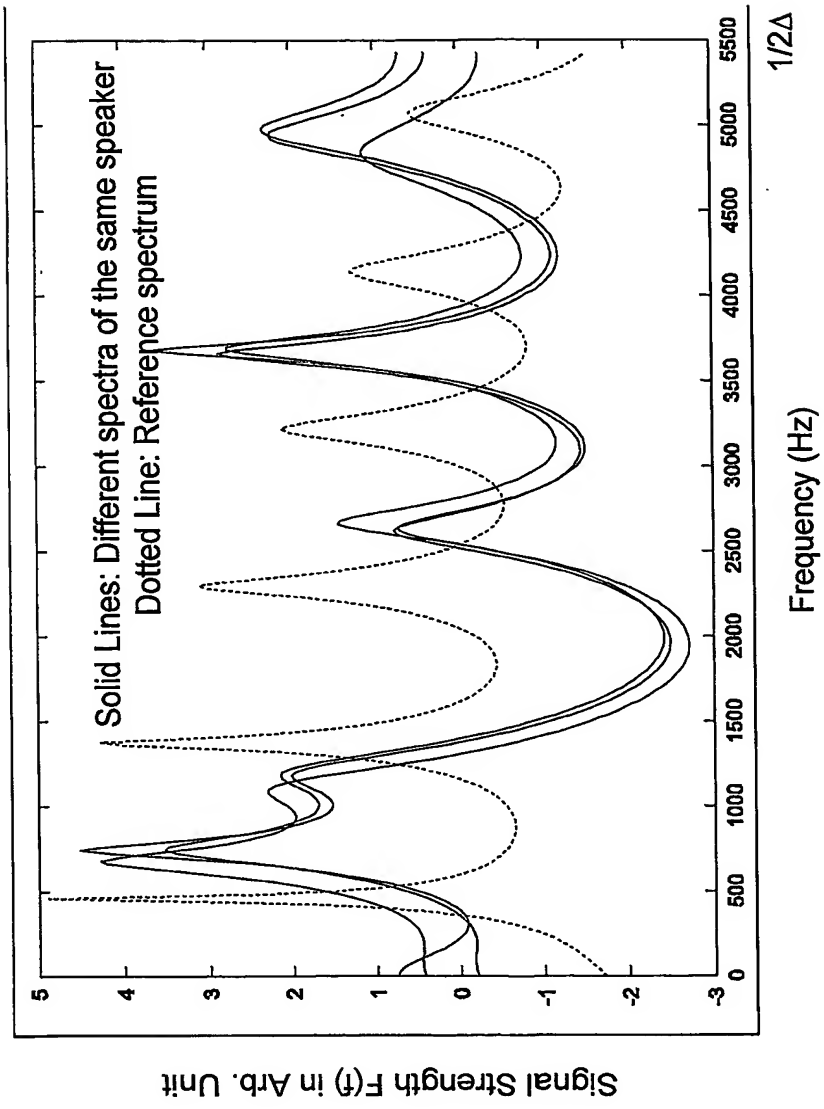

Solid Lines: Different spectra of the same speaker
Dotted Line: Reference spectrum
Signal Strength F(f) in Arb. Unit
Frequency (Hz)
1/2Δ
5
4
3
2
1
0
-1
-2
-3
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500

FIG. 2

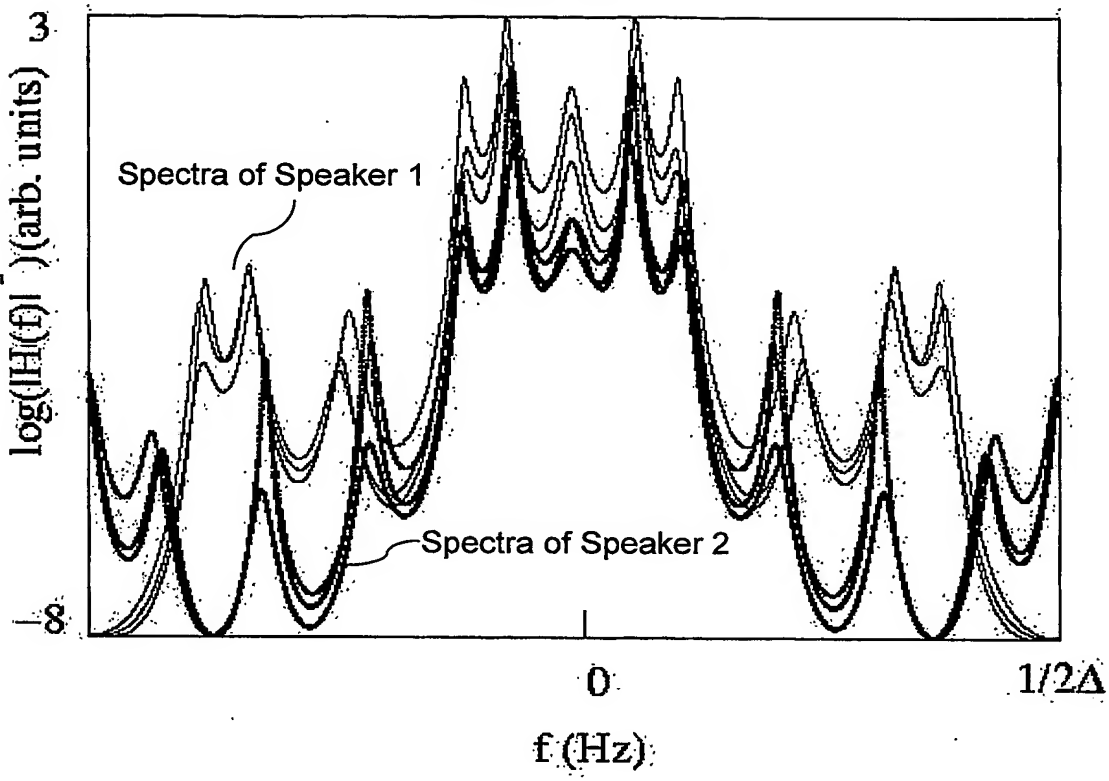

3
log(|H(f)|^2)(arb. units)
Spectra of Speaker 1
Spectra of Speaker 2
-8
0
1/2Δ
f (Hz)

FIG. 3

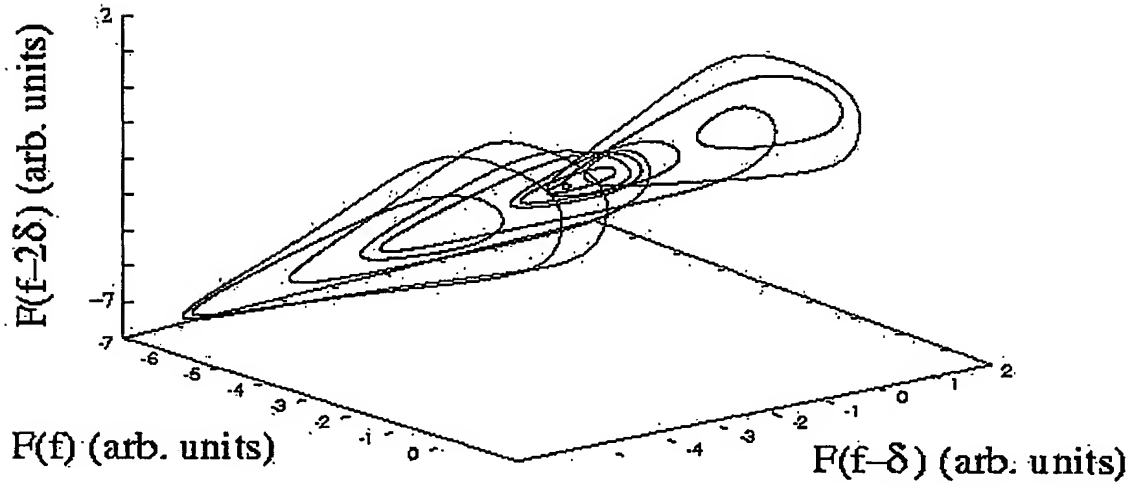

F(f-2δ) (arb. units)
F(f) (arb. units)
F(f-δ) (arb. units)

FIG. 4

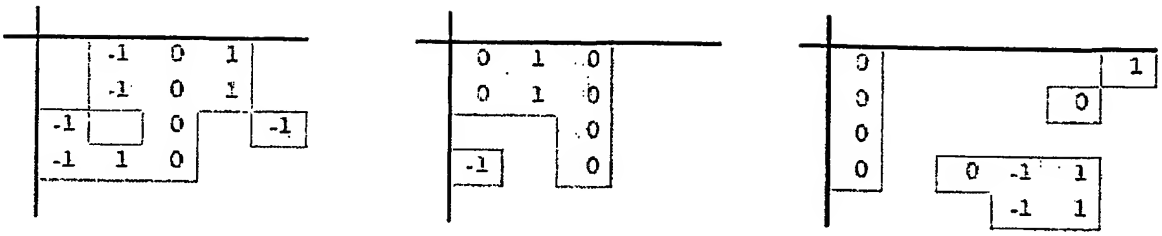
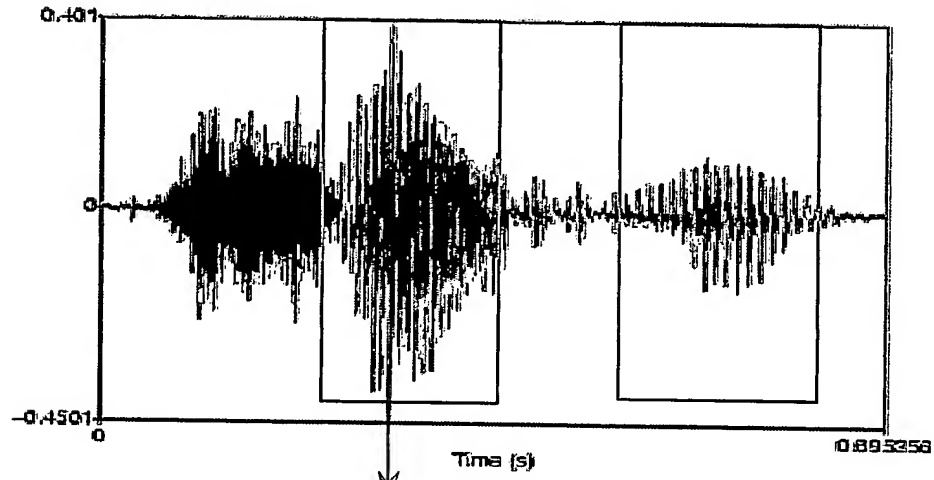


FIG. 5A



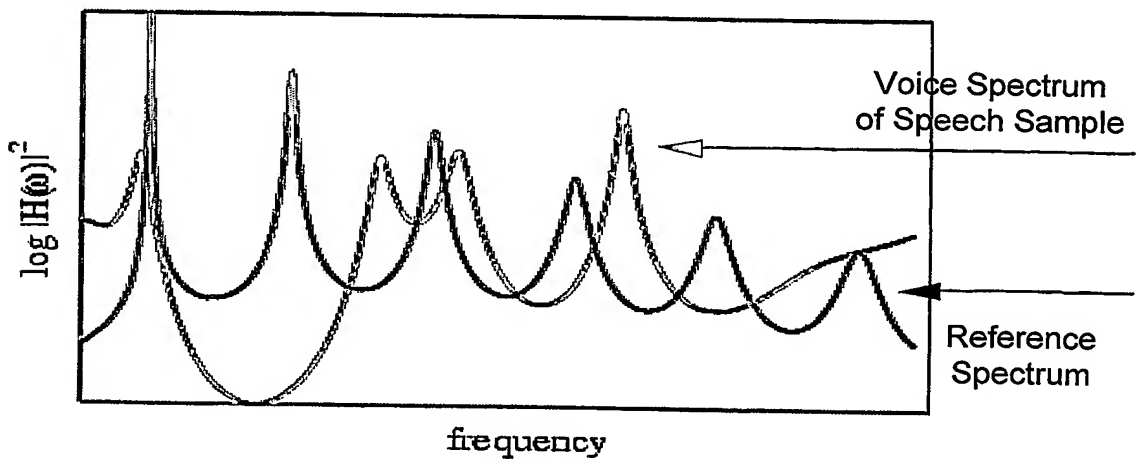


FIG. 5B

FIG. 5C

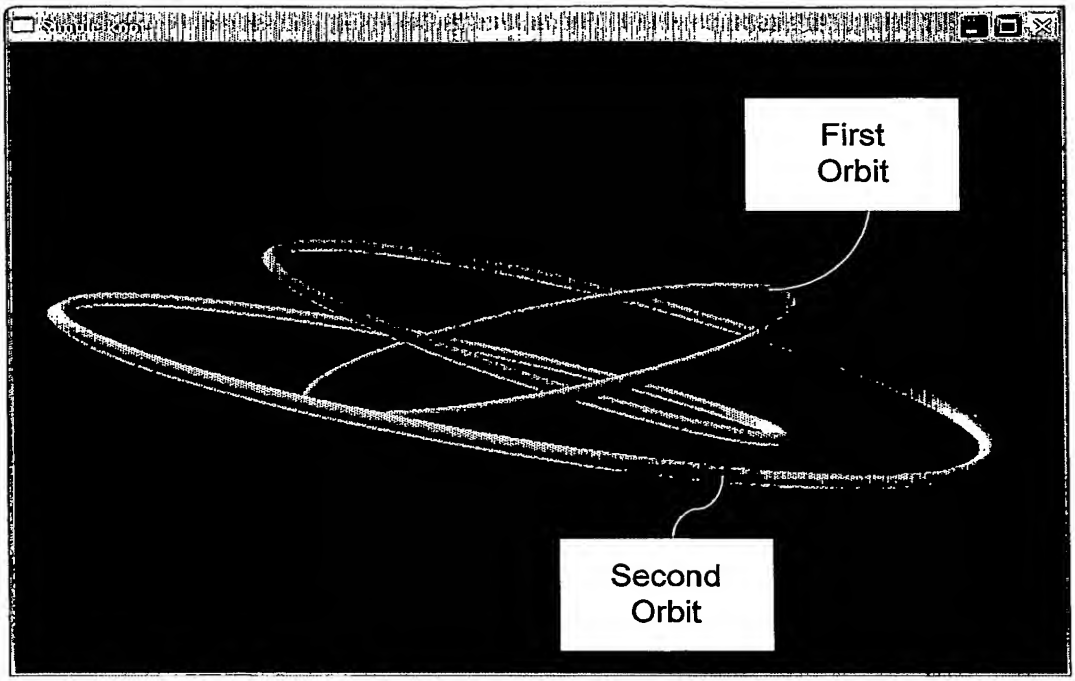


FIG. 5D

	1	2	3	4	5	6
1	0	1	0	0		
2	0	1	0	0		
3	0		0	0		
4	0		0	0		
5	0	1		0		
6	0	1	1	-1		0

FIG. 6A

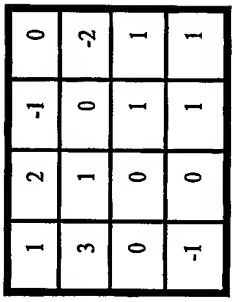


FIG. 6B

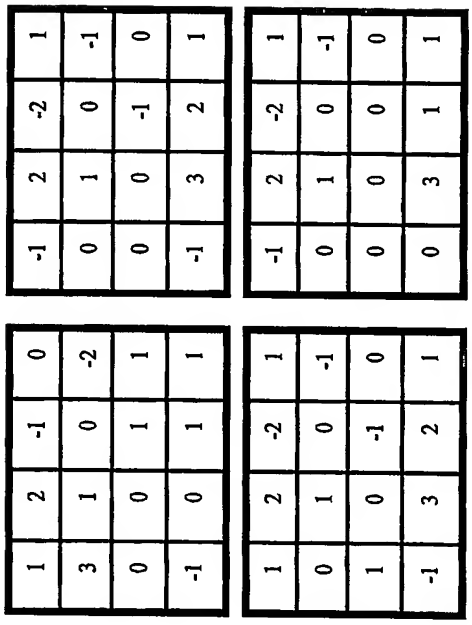


FIG. 6C

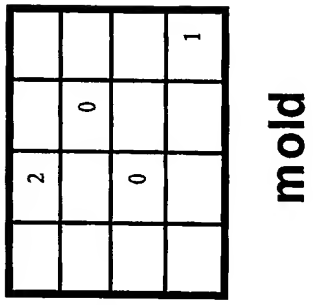


FIG. 7

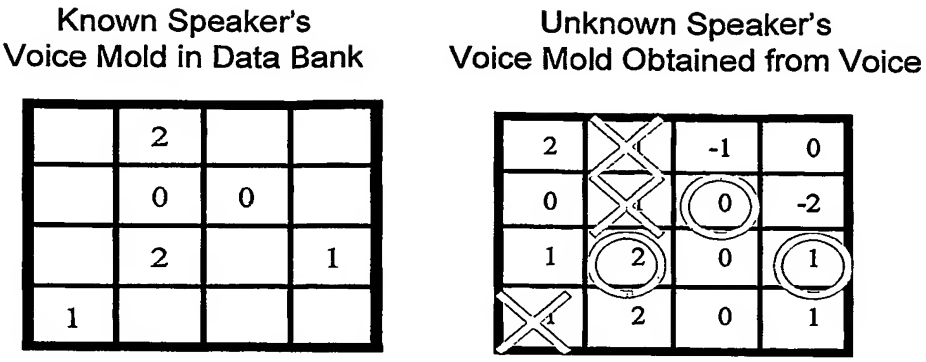

Known Speaker's
Voice Mold in Data Bank
Unknown Speaker's
Voice Mold Obtained from Voice

FIG. 8

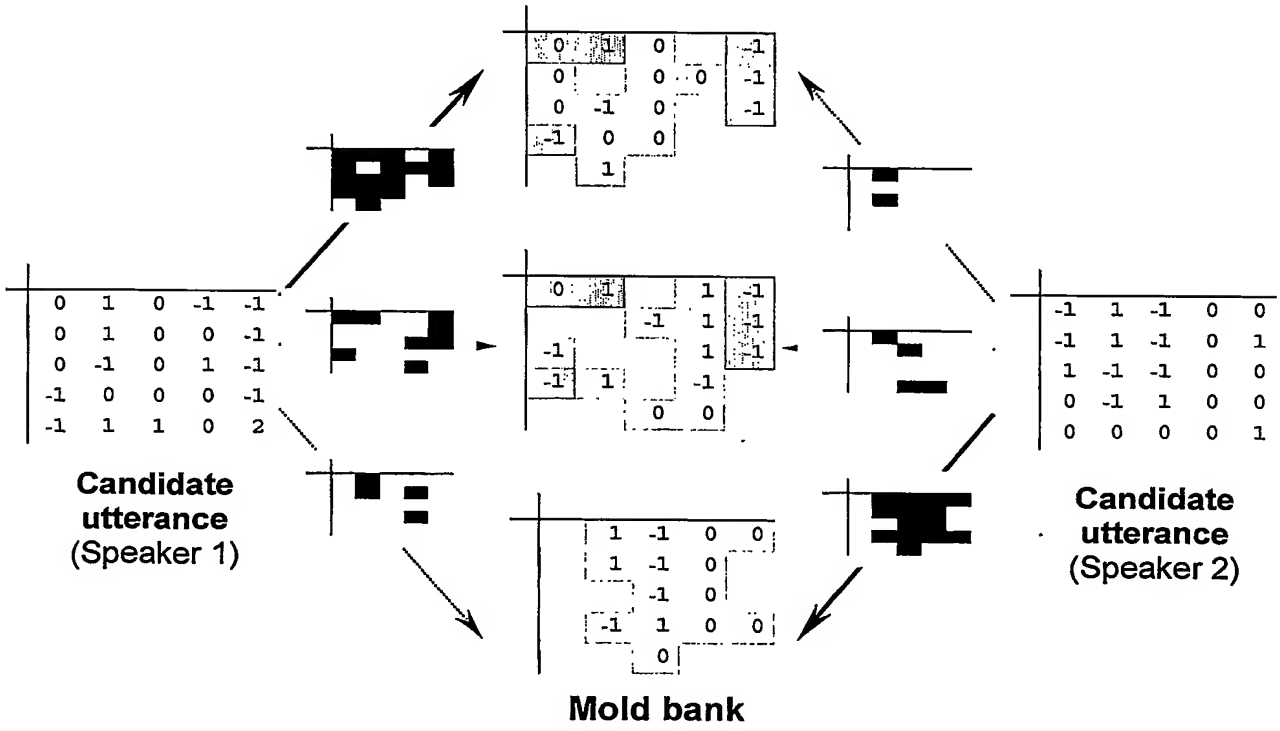

Candidate
utterance
(Speaker 1)
Candidate
utterance
(Speaker 2)
Mold bank

FIG. 9

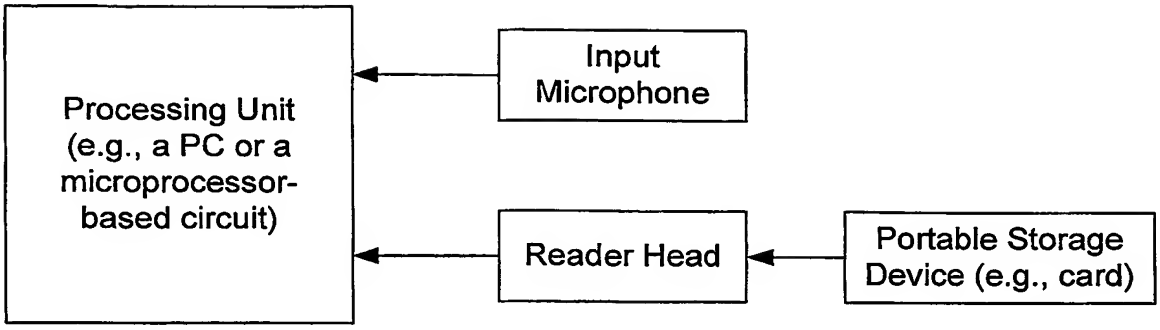
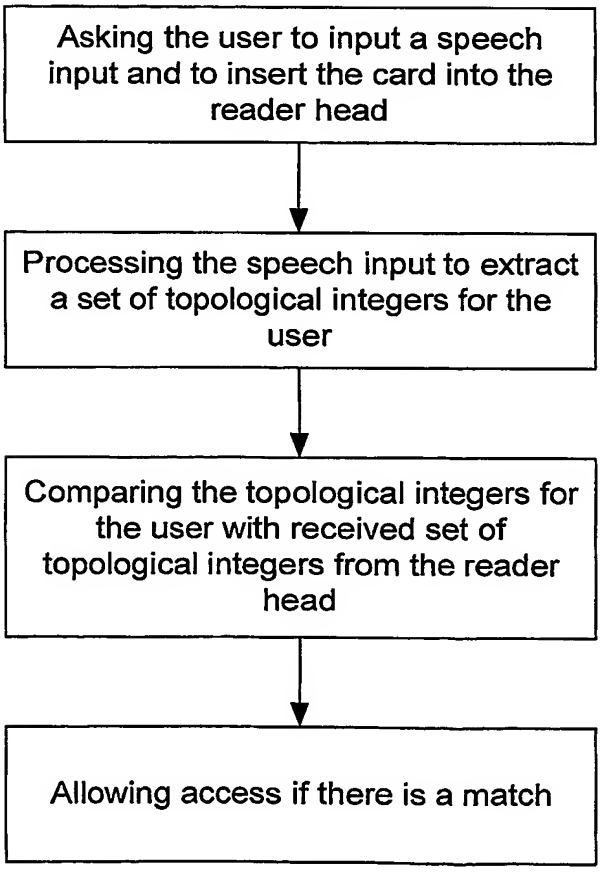

Processing Unit (e.g., a PC or a microprocessor-based circuit)
Input Microphone
Reader Head
Portable Storage Device (e.g., card)

FIG. 10


Asking the user to input a speech input and to insert the card into the reader head
Processing the speech input to extract a set of topological integers for the user
Comparing the topological integers for the user with received set of topological integers from the reader head
Allowing access if there is a match